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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/621,011

07/16/2003

Jurgen Ramm

H60-080 US

9108

21706

7590

05/28/2004

NOTARO AND MICHALOS

100 DUTCH HILL ROAD

SUITE 110

ORANGEBURG, NY 10962-2100

EXAMINER

BREWSTER, WILLIAM M

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 05/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/621,011

Applicant(s)

RAMM, JURGEN

Examiner

William M. Brewster

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 December 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☒ Certified copies of the priority documents have been received in Application No. 09/349,014.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Objections

Claim 25 is objected to because of the following informalities: in line 1, after N, subscript "x" should be "z". Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3-7, 10, 17, 19, 28, 30, 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Barbee Jr., et al., U.S. Patent No. 5,486,277.

Barbee anticipates a method for manufacturing a structural element comprising: in fig. 3, providing a first part with a surface substantially of copper 26, depositing a hard layer on said surface of said first part, said hard layer consisting of at least one of the following materials: a) SiO_x with $1.5 \leq x \leq 2$, b) TaSiN; c) TiN; d) AlO; e) TiSiN; f) TaN; g) SiN; h) WSiN; i) ReO; j) PdO; k) ZrO; l) YO; m) ZrN; n) NbN; o) VN; p) CuN; whereby said hard layer is amorphous under X-rays: amorphous SiO₂ 27, col. 9, line 56 - col. 10, line 18;

limitations from claims 3-7: further comprising the step of depositing said hard layer so that said hard layer is stable to at least 80° C - 300° C: 500° C, col. 8, line 49 - col. 9, line 18;

limitations from claim 10: wherein at least one of said first part or said second part is a wire: wherein 26, the first part, is a thin copper structure conducting electrons: a wire;

limitations from claims 17, 19: wherein said material of said hard layer comprises oxygen in a substoichiometric ratio, wherein said material comprises SiO₂: SiO₂, col. 9, line 56 - col. 10, line 18;

limitations from claims 28, 30, 31: further comprising depositing said hard layer as an electrically insulating layer; further comprising the step of selecting said hard layer to be of one of said materials; wherein said layer is a functional layer of a function of said element: dielectric of capacitor of oxide SiO₂.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 8, 10, 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Joshi, U.S. Patent No. 6,335,569 B1.

Joshi anticipates a method for manufacturing a structural element comprising: in fig. 8, providing a first part with a surface substantially of copper 102, wherein the first part is a wire 102, depositing a hard layer on said surface of said first part, said hard layer consisting of at least one of the following materials: a) SiO_x with $1.5 \leq x \leq 2$, b) TaSiN; c) TiN; d) AlO; e) TiSiN; f) TaN; g) SiN; h) WSiN; i) ReO; j) PdO; k) ZrO; l) YO; m) ZrN; n) NbN; o) VN; p) CuN; whereby said hard layer is amorphous under X-rays: wherein the hard layer 90 is amorphous Si_3N_4 or $\text{Ta}_x\text{Si}_y\text{N}_z$; further comprising the steps of providing a second part 104 with a surface of a metal, wherein said surface of second part substantially consists of copper, and connecting said first part with said second part by bonding said surface of said first part, upper surface of 102 to said surface of said second part, lower surface of 104, col. 11, lines 6-55.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 9, 25, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Joshi as applied to claims 1, 2, 10, 27 above, and further in view of Farrar, U.S. Publication No. 2002/0127845 A1.

Joshi does not specify forming the upper part of gold and aluminum, but Farrar does. Farrar teaches in figs. 2A, 2B, forming a lower conductive layer 215, bonded to an second layer 227 the surface of said second pad consists of gold and of aluminum, pp. 3-4, ¶ 35. Farrar gives motivation in p. 1, ¶ 5. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Farrar's process with Joshi's invention would have been beneficial because the structure has improved interconnect conductivity with lower capacitance.

Joshi does not specify the composition of the Ta, Si, and N in his amorphous layer leaving this dimension to be optimized by the practitioner.

"Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art . . . such ranges are termed 'critical

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ranges' and the applicant has the burden of proving such criticality . . . More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

In re Aller 105 USPQ 233, 255 (CCPA 1955). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmscher 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising there from. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Claims 11, 20, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barbee as applied to claims 1, 3-7, 17, 19, 28, 30, 31 above, and further in view of Asakawa et al., U.S. Patent No. 5,820,980.

Barbee does not specify forming the hard layer by sputtering, but Asakawa does. Asakawa teaches comprising the step of depositing said hard layer by a vacuum deposition process, wherein said hard layer consists of SiO_x and is deposited by sputtering, also comprising the step of depositing said Si by sputtering: forming a substrate and depositing a a-SiO_x on col. 3, lines 28-38. Asakawa gives motivation in col. 1, line 65 - col. 2, line 5. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Asakawa's

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process with Barbee's invention would have been beneficial because the film has good wear resistance.

Claims 12, 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barbee as applied to claims 1, 3-7, 17, 19, 28, 30, 31 above, and further in view of Parkhe, U.S. Patent No. 6,033,482.

Barbee does not specify purging the part with hydrogen plasma, but Parkhe does. Parkhe cleans with a plasma that purges parts with either hydrogen and nitrogen-hydrogen gas. Parkhe gives motivation in col. 1, lines 39-49. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Parkhe's process with Barbee's invention would have been beneficial because it cleans the wafer without forming liquid waste as would a HF cleaning.

Claims 18, 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Barbee as applied to claims 1, 3-7, 17, 19, 28, 30, 31 above, and further in view of Blumenfeld, U.S. Patent No. 3,615,942.

Barbee does not specify forming a hard layer by thermal treatment in ambient atmosphere, but Blumenfeld does. Blumenfeld specifies forming a substrate wherein depositing said hard layer comprises depositing a layer of Si and treating said layer of Si by a thermal treatment in at least one of a nitrogen plasma and in ambient atmosphere: an ambient atmosphere forming by depositing an amorphous SiO_x in an

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oxygen ambient, col. 1, lines 27-40. Blumenfeld gives motivation in col. 1, lines 27-40.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Blumenfeld's process with Barbee's invention would have been beneficial because the hard layer is less sensitive to elevated temperature.

Claims 23, 24, 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barbee as applied to claims 1, 3-7, 17, 19, 28, 30, 31 above, and further in view of Finely et al., U.S. Publication No. 2002/0009621.

Barbee does not specify forming a metallic layer, but Finely does. Finely teaches forming wherein said depositing comprises depositing a metallic layer and oxidizing said metallic layer, further comprising the step of oxidizing by at least one of the following parameters: thickness of the layer, temperature during oxidizing, and the atmosphere wherein said oxidizing is performed: oxidizing by controlling the atmosphere, p. 1, ¶ 4; further comprising the step of depositing said hard layer as an electrically conductive layer: inherently wherein all metals conduct, and hence metal oxides also conduct, if at a lower level of conductance.

Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barbee as applied to claims 1, 3-7, 17, 19, 28, 30, 31 above.

Barbee does not specify the thickness of the hard layer leaving this dimension to be optimized by the practitioner.

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"Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art . . . such ranges are termed 'critical ranges' and the applicant has the burden of proving such criticality . . . More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

In re Aller 105 USPQ 233, 255 (CCPA 1955). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmischer 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising there from. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to William M. Brewster whose telephone number is 571-272-1854. The examiner can normally be reached on Full Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

William M. Brewster

26 May 2004

WB